Vol. XI NOVEMBER, 1900 No. 11

THE

# NATIONAL GEOGRAPHIC MAGAZINE

---

## CONTENTS

PAGE

THE SAMOAN ISLANDS.....EDWIN V. MORGAN 417

THE MANILA OBSERVATORY.....REV. JOSÉ ALGUÉ, S. J. 427

THE LIMITED WATER SUPPLY OF THE ARID REGION
FREDERICK H. NEWELL 438

HURRICANES ON THE COAST OF TEXAS
GEN. A. W. GREELY, U. S. A. 442

AFRICA THE LARGEST GAME PRESERVE IN THE WORLD
JOHN B. TORBERT 445

ANNOUNCEMENTS..... 448

---

WASHINGTON

PUBLISHED FOR THE NATIONAL GEOGRAPHIC SOCIETY

BY McCLURE, PHILLIPS & CO.,

141-155 E. 25TH STREET, NEW YORK, AND 107 CORCORAN BUILDING, WASHINGTON

**Price 25 Cents** REPRINT **$2.50 a Year**

THE

# National Geographic Magazine

AN ILLUSTRATED MONTHLY

Editor: **JOHN HYDE**,
*Statistician of the U. S. Department of Agriculture*

**Associate Editors**

GENERAL A. W. GREELY,
*Chief Signal Officer, U. S. Army*

W J McGEE,
*Ethnologist in Charge, Bureau of American Ethnology*

HENRY GANNETT,
*Chief Geographer, U. S. Geological Survey*

C. HART MERRIAM,
*Chief of the Biological Survey, U. S. Department of Agriculture*

DAVID J. HILL,
*Assistant Secretary of State*

ELIZA RUHAMAH SCIDMORE,
*Author of "Java, the Garden of the East," etc.*

MARCUS BAKER,
*U. S. Geological Survey*

WILLIS L. MOORE,
*Chief of the Weather Bureau, U. S. Department of Agriculture*

H. S. PRITCHETT,
*Superintendent of the U. S. Coast and Geodetic Survey*

O. P. AUSTIN,
*Chief of the Bureau of Statistics, U. S. Treasury Department*

CHARLES H. ALLEN,
*Governor of Porto Rico*

CARL LOUISE GARRISON,
*Principal of Phelps School, Washington, D. C.*

GILBERT H. GROSVENOR, *Washington, D. C.*

## SPECIAL MAPS

PUBLISHED BY THE

## National Geographic Magazine

Map of Alaska (28 x 24 inches). Vol. IX, No. 4.

Chart of the World on Mercator's Projection (48 x 27 inches). Vol. VII, No. 3.

Map of South Africa (46 x 33 inches). Vol. X, No. 12.

Map of the Chinese Empire, Japan, and the Russian-Manchurian Railway (11 x 7½ inches). Vol. XI, No. 8.

Twelve Maps on the Alaskan Boundary Dispute. Vol. X, No. 11.

Map of Cuba (18 x 7½ inches). Vol. IX, No. 5.

Twenty-five Full-page Charts, showing storm tracks and methods of weather forecasting. Vol. VIII, No. 3.

Map of Northeastern China (36 x 28 inches). Vol. XI, No. 9.

**By Mail for 25 Cents Each**

**CORCORAN BUILDING : : : WASHINGTON, D. C.**

Entered at the Post-office in Washington, D. C., as Second-class Mail Matter.

# NATIONAL GEOGRAPHIC SOCIETY

OFFICES

Rooms 107, 108, Corcoran Building,
Fifteenth and F Streets N. W., Washington, D. C.
Office Hours: 8.30 A. M. to 5.00 P. M.
Telephone No. 471

| | |
|---|---|
| President | ALEXANDER GRAHAM BELL |
| Vice-President | W J McGEE |
| Corresponding Secretary | WILLIS L. MOORE |
| Recording Secretary | A. J. HENRY |
| Foreign Secretary | ELIZA RUHAMAH SCIDMORE |
| Treasurer | HENRY GANNETT |

Board of Managers

| 1898–1901 | 1899–1902 | 1900–1903 |
|---|---|---|
| A. GRAHAM BELL | CHARLES J. BELL | MARCUS BAKER |
| HENRY GANNETT | G. K. GILBERT | HENRY F. BLOUNT |
| A. W. GREELY | A. J. HENRY | F. V. COVILLE |
| JOHN HYDE | DAVID J. HILL | S. H. KAUFFMANN |
| W J McGEE | C. HART MERRIAM | WILLIS L. MOORE |
| F. H. NEWELL | H. S. PRITCHETT | W. B. POWELL |

The National Geographic Magazine is sent free of charge to all members of the National Geographic Society

## Recommendation for Membership in the National Geographic Society

The following form is enclosed for use in the nomination of persons for membership. *Please detach and fill in blanks and send to the Secretary.*

DUES: Resident, $5; Non-resident, $2; Life membership, $50. If check be enclosed, please make it payable to order of the National Geographic Society, and, if at a distance from Washington, remit by New York draft or P. O. money-order.

.....*1900*

***To the Secretary, National Geographic Society, Washington, D. C.:***

*Please propose*.....

*address:* .....

.....

*for*.....*membership in the Society.*

.....

It is understood that persons nominated on this blank have expressed a desire to join the Society.

# OUR BOOK DEPARTMENT

## The Life of the Master

By Rev. JOHN WATSON, D.D. ("Ian Maclaren")

The author of "The Mind of the Master" and "Beside the Bonnie Brier Bush" has written a story of the life of the Saviour which will embody all that is told in the sacred records, along with such supplementary information as has been gathered by modern scholarship. The work is written in a style of charming sincerity and directness. It will contain double the amount of material which is at present appearing in McClure's Magazine. *In Press.*

## Life of Napoleon Bonaparte

By IDA M. TARBELL

This is a profusely illustrated work, prepared with the aim of omitting no important Napoleonic picture. In the case of great paintings indispensable to a complete pictorial life of Napoleon, of which etchings or engravings were not obtainable, photographs were specially prepared; and in consequence the work is singularly complete on its pictorial side. Moreover, it contains one of the most readable short biographies of Napoleon anywhere in existence.

*65th Thousand. Revised Edition, richly illustrated.* *In Press.*

## The History of the South African War

By A. CONAN DOYLE

This is the first important literary fruit of Mr. Doyle's army experience in South Africa. The author's painstaking methods in historical work are as well known to readers as his skill as a story teller, and his new history of the Boer War will for this reason possess unusual merit. *In Press.*

## The Life of Abraham Lincoln

By IDA M. TARBELL

*Drawn from original sources, and containing many speeches, letters and telegrams hitherto unpublished.*

"A portrait that helps us to understand better than ever before the manner of man Abraham Lincoln was. . . . A narrative that is so intimate in its revelations as this of Miss Tarbell's helps us to realize that, with all his greatness, Abraham Lincoln was cast in the mold of our common humanity. . . . Her work presents a portrait of the man that no student of history can afford to miss, for it is very human, and does full justice to that homely side of Lincoln's character which has done more than anything else to give him a hero's place in the hearts of the common people."—*Brooklyn Eagle.*

*New Edition, with 32 full page illustrations. Index. 2 volumes.* 8vo, 6¼ x 9¼. $5.00.

## McCLURE, PHILLIPS & CO.

141-155 East 25th Street, New York

Shortest Line
TO
St. Paul and Minneapolis
and the Northwest

CHICAGO GREAT WESTERN
RAILWAY

"Maple Leaf Route"

For tickets, rates or any detailed information apply to your home agent or write to

F. H. LORD,
Gen'l Pass'r and Ticket Agent,
CHICAGO.

A VITAL POINT

"IMPROVEMENT THE ORDER OF THE AGE."

A TYPEWRITER'S PRINTING MECHANISM

MUST BE SCIENTIFICALLY CONSTRUCTED. THIS POINT IS OF UTMOST IMPORT FOR

EASY OPERATION AND PERFECT EXECUTION.

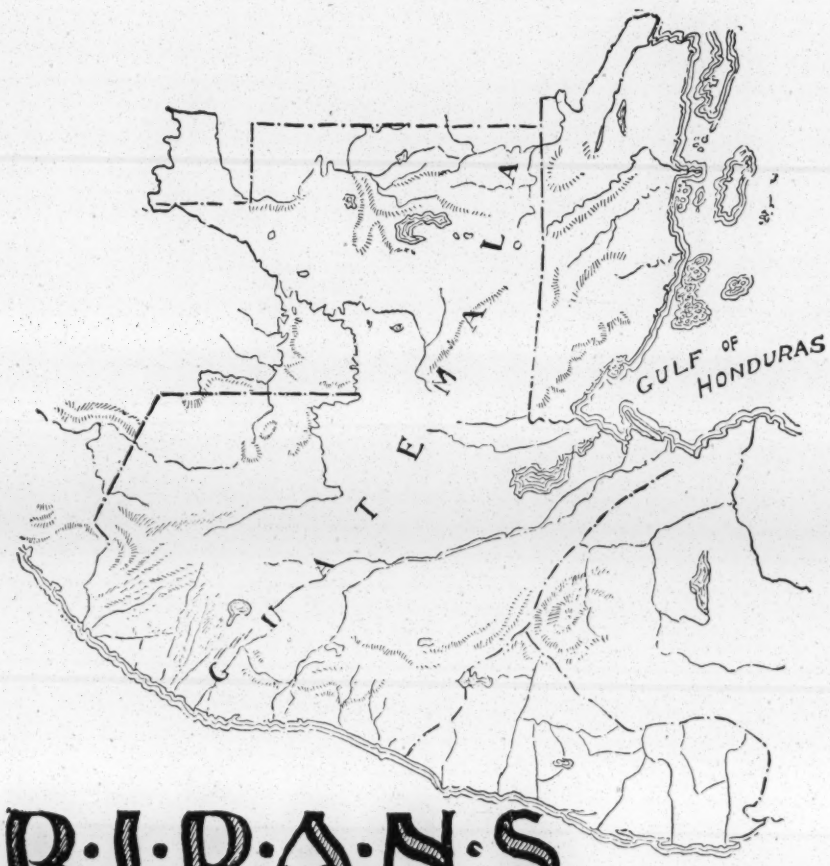
The Smith.. Premier Typewriters

Superior on This Point as Well as on All Others.

ONLY CORRECT PRINCIPLES EMPLOYED.

The Smith Premier Typewriter Co.,
SYRACUSE, N. Y., U. S. A.

Catalogues and Information at Washington Office, No. 519 Eleventh Street.




R·I·P·A·N·S

A practical journalist, long a member of the staff of the Washington *Evening Star*, resigned his position to go to Guatemala. Before he left Washington he had been a firm believer in the medicinal qualities of Ripans Tabules, and took a lot of them with him to Guatemala, where he earned the friendship of the captain of the steamer, which sails from San Francisco and stops at ports in Central America, by making known to him the marvelous virtues of R-I-P-A-N-S, the medical wonder of the century. He often dilates upon the captain's enthusiasm about the Tabules and asserts that the people of the tropics suffer terribly from indigestion, and that the Tabules are now known most favorably throughout Central America. Ripans Tabules quiet the nerves, compose the mind, allay irritation, and invite repose. One gives relief.

WANTED:—A case of bad health that R-I-P-A-N-S will not benefit. They banish pain and prolong life. One gives relief. Note the word R-I-P-A-N-S on the package and accept no substitute. R-I-P-A-N-S, 10 for 5 cents, or twelve packets for 48 cents, may be had at any drug store. Ten samples and one thousand testimonials will be mailed to any address for 5 cents, forwarded to the Ripans Chemical Co., No. 10 Spruce St., New York.

## Henry Romeike's Bureau of Press Cuttings,

### 110 Fifth Avenue, New York,

Reads every paper of importance published in the United States, and through its European Agencies in London, Paris, Berlin, and Vienna every paper of importance published in Europe and the British Colonies. One subscription on any given subject will bring notices from the United States, and if desired also from the European papers.

WRITE FOR TERMS

Please mention this Magazine when writing to advertisers.

# CALIFORNIA..

OF course you expect to go there this Spring. Let me whisper something in your ear. Be sure that the return portion of your ticket reads via the . . .

## Northern Pacific-Shasta Route.

Then you will see the grandest mountain scenery in the United States, including **Mt. Hood** and **Mt. Rainier**, each more than **14,000** feet high, **Mt. St. Helens**, **Mt. Adams**, and others. You will also be privileged to make side trips into the **Kootenai Country**, where such wonderful new gold discoveries have been made, and to **Yellowstone Park**, the wonderland not only of the United States, but of the World. Close railroad connections made in Union Station, Portland, for Puget Sound cities and the east, via **Northern Pacific.**

**CHAS. S. FEE,**
*General Passenger Agent, St. Paul, Minn.*


## STANDING COMMITTEES

OF THE

## NATIONAL GEOGRAPHIC SOCIETY

**Committee on Publication:** John Hyde, A. W. Greely, W J McGee, Henry Gannett, C. Hart Merriam, David J. Hill, Marcus Baker, Willis L. Moore, H. S. Pritchett, O. P. Austin, Charles H. Allen, Gilbert H. Grosvenor, Miss E. R. Scidmore, and Miss C. L. Garrison.

**Committee on Communications (Lectures):** W J McGee, F. H. Newell, Herbert Putnam.

**Committee on Admissions:** Marcus Baker, S. A. Aplin, Gilbert H. Grosvenor.

**Committee on Research:** G. K. Gilbert, C. Hart Merriam, A. W. Greely, G. W. Melville, Gifford Pinchot.

**Committee on Finance:** C. J. Bell, Henry Gannett, John Joy Edson.

**Executive Committee:** Henry Gannett, John Hyde, A. J. Henry.

**Committee on Amendments:** Willis L. Moore, G. K. Gilbert, W J McGee, David T. Day, O. H. Tittmann.

**Rooms 107-108 Corcoran Building, Washington, D. C.**

PEOPLE like to read about the great and wonderful country of the **Southwest**; of its quaint and curious towns, its ancient civilizations, its natural marvels. They like to get accurate information about **California and the Pacific Coast.** This is because most people want to some day see these things for themselves. . . . . .

A charming book covering these facts is issued by the

**PASSENGER DEPARTMENT**
OF THE
**Southern Pacific Railway,**

and will be sent to any one, postpaid, on receipt of **TEN CENTS.**

THE BOOK IS ENTITLED

# "Through Storyland to Sunset Seas,"

You can get a copy by writing to

**S. F. B. MORSE,**
**General Passenger Agent,**
**Southern Pacific,**
**New Orleans,**

and sending **10 cts.** to defray postage.

AND IS A WONDERFULLY HANDSOME VOLUME OF **205** PAGES, WITH **160** ILLUSTRATIONS. . . .

The paper used is FINE PLATE PAPER, and every typographical detail is artistic. It is a story of what four people saw on just such a trip as you would like to make. . . . . .

# THE CHICAGO, MILWAUKEE AND ST. PAUL RAILWAY

**..RUNS..**

**Electric Lighted and Steam Heated Vestibuled Trains** between **Chicago, Milwaukee, St. Paul and Minneapolis** daily.

**Through Parlor Cars** on day trains between **Chicago, St. Paul and Minneapolis.**

**Electric Lighted and Steam Heated Vestibuled Trains** between **Chicago and Omaha and Sioux City** daily.

Through Sleeping Cars, Free Reclining Chair Cars and Coaches between **Chicago and Kansas City, Mo.**

Only two hours from Chicago to Milwaukee. Seven fast trains each way, daily, with Parlor Car Service.

**Solid trains** between **Chicago** and principal points in **Northern Wisconsin** and the **Peninsula of Michigan.**

Through Trains with Palace Sleeping Cars, Free Reclining Chair Cars and Coaches between **Chicago** and points in **Iowa, Minnesota, Southern and Central Dakota.**

The **finest Dining Cars** in the World.

The **best Sleeping Cars. Electric Reading Lamps in Berths.**

The best and latest type of **private Compartment Cars, Free Reclining Chair Cars, and buffet Library Smoking Cars.**

**Everything First-class.** First-class People patronize First-class Lines.

Ticket Agents everywhere sell tickets over the Chicago, Milwaukee and St. Paul Ry.

GEO. H. HEAFFORD,
*General Passenger Agent, Chicago, Ill.*

---

## The Fastest and Finest Train in the West . . . .

IS

UNION PACIFIC
THE OVERLAND ROUTE
WORLD'S PICTORIAL LINE

# The Overland Limited

.....TO.....

## UTAH and CALIFORNIA.

FROM 16 TO 20 HOURS
SAVED BY USING

## "THE OVERLAND ROUTE."

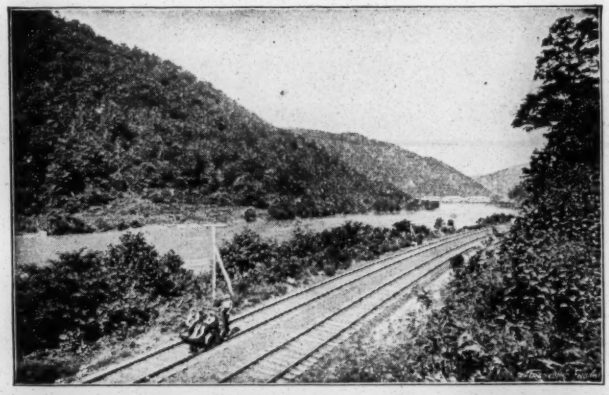
**Double Drawing-Room Pullman Sleepers.**
**Free Reclining Chair Cars.**
**Pullman Dining Cars.**
**Buffet Smoking and Library Cars.**

*Send for Descriptive Pamphlet "49-96," Folders and other Advertising Matter.*
(Mention this publication.)

E. L. LOMAX,
*General Passenger and Ticket Agent,*
OMAHA, NEB

---

Please mention this Magazine when writing to advertisers.



# CHESAPEAKE & OHIO RY.

THE F. F. V. LIMITED is one of the finest trains hauled over any railway track in America. It runs solid between Cincinnati and New York, the route from Washington being over the Pennsylvania system. It has every modern convenience and appliance, and the dining-car service has no superior if it has an equal. The road-bed is literally hewed out of the eternal rocks; it is ballasted with stone from one end to the other; the greater portion is laid with one-hundred-pound steel rails, and although curves are numerous in the mountain section, the ride is as smooth as over a Western prairie.

One of the most delightful rides in all the route is that through the New River valley. The mountains are just low enough to be clad with verdure to the very top, and in the early spring every variety of green known to the mixer of colors can be seen, while the tones in autumn take on all the range from brown to scarlet.

These facts should be borne in mind by the traveler between the East and the West.

**H. W. FULLER,** *Genl. Pass. Agent, Washington, D. C.*

# WOODWARD & LOTHROP

invite attention to their selections and importations in desirable merchandise for the present season, comprising in part

Paris and London Millinery, Silks, Velvets, High-class Dress Goods, Ready-to-Wear Outer Garments for Women, Girls and Boys, Hand-made Paris Lingerie, Corsets, Infants' Outfittings, Hosiery, Laces, Ribbons, Embroideries, Linens, Upholstery Goods, Books, Stationery, Card Engraving; also Paris, Vienna, and Berlin Novelties in Leather and Fancy Goods; Sterling Silver Articles, Lamps, Clocks, Bronzes, etc., for Wedding, Birthday, and Anniversary Gifts.

## 10th, 11th, and F Sts. N. W., Washington, D. C.

THE
NATIONAL GEOGRAPHIC MAGAZINE

VOL. XI NOVEMBER, 1900 No. 11

# THE SAMOAN ISLANDS

By EDWIN V. MORGAN,
*Secretary to the Samoan Commission*

The arrangements for the disposition of the Samoan Islands entered into between the governments of Great Britain, Germany, and the United States may be considered as removing from the international chess-board these small islands which for twenty-five years have been the pawns of the three protecting powers. Whether our European partners are satisfied with their share of the division, their geographical societies and foreign offices alone are in a position to say. The balance sheet of a ledger which states the value of an interchange of territory in Africa and the South Pacific must necessarily wait many years before it can be struck. Whatever the final conclusion may be, the United States has wisely decided that the share that has come to her is the share, and the only share, which she desires, since without assuming fresh responsibilities, either for defense or for government, she has secured an entrepôt and a naval base unique in the Pacific.

Samoa, called by former geographers the Navigators Islands, from the skill in navigation shown by its inhabitants, consists of four principal bits of land lying in the South Pacific between 169° and 173° west longitude and 13° and 15° south latitude, nearly midway between New Zealand and Hawaii. The number of islands in the group may, by counting the smaller, be increased to 11, or even 14, but only Savaii, Upolu, Tutuila, and the three usually included under the general term Manua, with Manono and Apolima, are important. All are verdure-clad and inhabited, and in appearance and shape resemble immense green hats, the interior representing the crown being mountainous, while the brim or shore is covered with cocoanut palms, breadfruit, banana, and other tropical trees, which furnish the native

food. At some prehistoric period the peaks of a submerged mountain chain running northeast and southwest have been lifted from the depths of the ocean by the upheaval of volcanoes now long extinct. Accumulations of soil brought by heavy rains from the mountains meet the ever-growing reef, which prevents easy approach to land except in those places where fresh-water streams, forcing their way through, form openings in the coral barrier. Between reef and shore a lagoon, varying in width from two hundred yards to two or three miles, provides a secure highway for coast and inter-island traffic. The entire length of the group, if Rose Island be included, is little less than 300 miles, and its gross area in round numbers is 832,000 acres, a territory larger than the state of Rhode Island by 50 and smaller than Delaware by 750 square miles.

The attention of the people of the United States was first drawn to the islands in the year 1871, when E. Wakeman prepared a report on them after an examination which he had made at the request of W. H. Webb, then considering the establishment of a line of steamers from San Francisco to Sydney *via* Hawaii and Samoa, over the route since traversed by the Oceanic Company. Apia, on Upolu, was then, as it is today, the only settlement of size. Mr Wakeman foretold, however, with possibly too great optimism, that on Tutuila, on the shores of Pago-Pago Bay, a town would arise which might have a great commercial future. The only protection to Apia harbor is a bar, awash at low tide, which even in calm weather does not prevent a swell from entering that makes vessels strain at their cables and often prevents colliers from coaling a steamer. During the hurricane season, from January to April, the men-of-war in port keep steam up ready to put to sea when a storm threatens, as H. M. S. *Calliope*.succeeded in doing in the hurricane of 1889.

At Pago-Pago there is a double harbor, shaped not unlike a fish-hook. The entrance to the outer half is three-fourths of a mile wide, with soundings of 36 fathoms, while the inner, extending inland more than a mile, with a breadth of from 1,100 to 3,000 feet, can furnish ample room and safe anchorage, in spite of its depth, for a score of steamers. Its mouth is protected by a pair of promontories and by an island, and around its sides hills spring abruptly to a height of from 800 to 1,000 feet, Matafas, the peak at the entrance, reaching 2,359 feet. Palms and other tropical trees so cover these hills to their summits that when seen from any high point the ground appears completely hidden by a dense mass of foliage, from

which round, thatched huts peep like huge beehives. On the other side of the island, across the mountains and ten miles away, is Leone, the principal settlement, where the London Missionary Society has a station and where a store or two, kept by white traders, supply the natives with their favorite articles of American manufacture—cotton goods, kerosene, and tinned salmon. Leone was not attacked during the recent outbreak, and still retains a primitive appearance, as do also the villages about Pago-Pago, where Mauga is high chief.

It was with the father of the present bearer of that name that Commander (afterward Admiral) Richard W. Meade, U. S. N., made the compact which brought Tutuila in touch with the United States. On board the *Narragansett*, February 17, 1872, he signed with Mauga an agreement by which this country might acquire, if the Senate approved, "the exclusive privilege of establishing in the said harbor of Pago-Pago a naval station for the use and convenience of the vessels of the United States Government." and obtained a promise that Mauga would not grant a like privilege to any other foreign power or potentate. On March 9 in the same year a convention was arranged between Mauga and three other chiefs of Tutuila, by which they bound themselves to form a league and confederation for their mutual welfare and protection and to unite their several districts under a flag made for them by Meade out of old bunting. It was partly due to the fact that it was not in the interest of any one chief to keep it, and partly because there was no central power of sufficient strength to enforce obedience, that this convention was not faithfully kept. Meade, foreseeing that this would be the case, recommended that the United States should ratify the agreement between Mauga and himself, and for that purpose it was sent by President Grant to the Senate, which body did not ratify it until 1878, when certain objectionable features were eliminated.

It is commonly and incorrectly believed that by this treaty land was acquired. All the rights gained, however, were the concession which gave our vessels the privilege "of entering and using the port of Pago-Pago and establishing there a station for coal and other naval supplies for their naval and commercial marine," the Samoan government at the same time promising neither "to exercise nor authorize any jurisdiction within the port adverse to these rights."

In the following year Germany and England, which had long had interests in the group and were anxious to enjoy privileges equal to

those secured by us, concluded treaties with the Kingdom of Samoa, by which the former obtained the right to establish a naval station in the harbor of Saluafata, in Upolu, which should not be granted to any other nation, and the latter the right to found a naval station and coaling depot on the shores of a Samoan harbor, to be designated by Her Majesty, there being excepted from this right the harbors of Apia and Saluafata and that part of Pago-Pago which might thereafter be "selected by the Government of the United States as a station." The selection was not made until some years later, when the important strategic point of Goat Island, at the entrance of the inner harbor, and a piece of land between 15 and 16 acres in extent was purchased of the native owners for the United States. Upon this land a firm of American contractors is now erecting a coal shed and a steel pier which is to extend 250 feet from shore to the edge of the coral reef. The cost of these improvements is to be a quarter of a million dollars, and it is thought that the contractor will clear but an insignificant sum by his undertaking, since the expense of bringing materials from San Francisco and the high price of labor will absorb the profit he might make were he engaged upon the same work at home.

A story is current that some years ago a shipload of coal, brought from Norfolk at great expense, was dumped on to the beach. In the belief that a sufficient quantity still remained to coal, or at least partially coal, his flagship, an admiral of our navy recently visited Pago-Pago, only to find that the last scuttleful had been carried off by the half-caste widow of a former United States consul, set to guard the pile at the munificent salary of $10 a year.

Commercially, the islands which have come to the United States, either singly or in a group, are unimportant so far as their local production and consumption are concerned, but in their relation to a nation like ours, desiring to cultivate trans-Pacific commerce, they are of the first importance. Mr Goward, an expert who examined them under instructions from the State Department, reported that from a naval point of view Pago-Pago was the key to Samoa, which, in its turn, was the key to Central Polynesia by reason of its geographical position—in the course of vessels from San Francisco to Auckland, from Panama to Sydney, and from Valparaiso to China and Japan—and from being outside the hurricane track.

Throughout the islands the cultivation of cotton was at one time attempted, but the labor was found to be too great, and it has been

practically abandoned. Coffee, it is believed, will yet be cultivated with success. Cocoa thrives, and the plantations are being largely increased. The commercial interests of Germany are generally conceded to be greater than those either of Great Britain or the United States, and for that reason perhaps it is well that Upolu and Savaii should fall to her. These are almost exclusively in the hands of one house, with headquarters at Hamburg, known familiarly at Apia as "the Firm," which succeeded the older South Sea house of Godeffroy & Son, and which exports to Europe and America, in specially chartered ships, the principal product—copra, the dried meat of the cocoanut tree. The copra gathered by the natives, as well as that sold by them to merchants not of German nationality, becomes ultimately the property of this house, a statement sometimes disputed because, as the copra is shipped in British bottoms and frequently billed to British ports, it is somewhat difficult to ascertain with absolute accuracy to the credit of which nation its production and exportation are due.

The inhabitants of the islands are of Polynesian stock and are clearly related to the natives of both Hawaii and New Zealand, but, unlike them, do not seem to be threatened with rapid extermination. Their number is not definitely known, because all data upon the subject have been gathered from approximate estimates and not from official sources. The last general effort to take a census for the group, made a dozen years ago, resulted in fixing the total population at 35,000, and the general belief among the missionaries is that during the present decade it has decreased to 32,000. An epidemic of measles, which caused the death of some thousand persons and which is partly responsible for this decrease, was not prevalent, however, on Tutuila, and that island, with Manua, may at the present time contain, in round numbers, 5,000 natives. The comparative isolation of these two, separated from their western sisters, Upolu and Savaii, by 40 miles of rough ocean, not merely makes it difficult for disease to spread to them, but cuts off their inhabitants from a close connection with the political life of their fellow-Samoans. During the last war none of them was the scene of battle, and had not their warriors been carried in British and American men-of-war to Upolu to assist the Tanu party, it may be doubted whether they would have broken the peace. Manua maintains a government independent of that which directs the affairs of the other islands, and does not take part in the quarrels of rival chiefs or in general in Samoan matters, although on the occasion of the bestowal of the highest title,

"le Tupa" (the grown), upon the chief who is to be recognized as the sovereign of the group, Manua, together with Tutuila, is represented by Lufi-Lufi in Upolu.

The Samoans are preëminently a people of contrasts. They are all nominally Christians and Sabbatarians. In every village is a church, reproducing accurately, both in its architecture and decorations, buildings used for similar purposes in Europe and America. Nearly all adults can read and write, and the missionaries print for them books relating not only to religious but to secular subjects as well. Alcoholic liquors, though easily obtainable, are but little used. On the other hand, both sexes go almost naked—a short loin-cloth being their only garment—and are oiled and painted in a strangely barbaric manner. Though iron is used in weapons, pottery is unknown, cups and bowls being made from cocoanuts. Similarly, in the moral sphere they seem to have many of the gentle virtues. They are courteous and hospitable, and yet a trivial quarrel changes them instantly into barbarians who mutilate their enemies when dead and resort to other savage practices. Extreme laziness is a leading characteristic. They can scarcely be induced to labor on European plantations, and on their own they do only just enough work to supply their immediate needs. They do not trade, there is nothing to hunt or shoot, and although there is plenty of fish in the sea, they rarely eat them, and are with difficulty induced to catch them for foreigners. It is not surprising that people who are at once lively, intelligent, and without occupation—people for whose wants nature has amply provided by giving them a warm climate and a plenitude of vegetable food, gathered without exertion—should quarrel with one another, or that their passion when once exhausted should leave no trace of sullenness behind.

For practical purposes, the natives may be divided into four classes. At the head stand the chiefs, who are hereditary in the sense that they must belong to certain families, but elective in that they exercise authority by virtue of titles conferred on them. The Tulafale, talking-man, is their executive officer, who phrases their thought in eloquent language, and is frequently the central figure in the district and the source of authority. Below him and above the lowest class, composed of what are known as the "common people," are the native teachers and catechists, who wear more clothes and do less fighting than the rest of the population and are under the general charge of the European missionaries.

There is nothing in the dress or bearing of a high chief which enables a foreigner to distinguish him, but he is isolated from the rest of the people by a system of rigid etiquette. No one may hold up an umbrella or do certain kinds of work in his presence, and a special vocabulary is set apart in which to address him. The common names for food, an axe, a pig, etc., are tabooed in his presence. His face, his anger, and other attributes are described in an entirely different set of words from those used for ordinary men. To address him requires a special branch of knowledge, and he who visits a high chief does well to make sure of the competence of his interpreter. Hedged about as he is, the chief, in his intercourse with persons not of his rank, has come to depend largely on his "talking-man," who, like the chief, is elected from certain families in which the office is hereditary. As a rule, no one is elected who has not a gift for oratory, which is a common talent in Samoa. Some talking-men are elected for the large provinces and some for the smaller subdivisions of which each province is made up, but in either case their duties and powers are considerable. They are men of much dignity of carriage, and as they stand leaning upon a staff of office with a "fue," or fly-flap, cast over one shoulder, with which to occasionally emphasize their remarks, they compare favorably in appearance with the orators of a nation more civilized than themselves. In addition to speaking in the name of the chief, it is their duty to distribute food at all public functions where precedence and etiquette are of importance and to perform other official acts. During the late war party feeling was keenly aroused and the cause of Mataafa much strengthened by the desertion of Lauti, the principal Tulafale of Malietoa Laupepa, the father of Tanu, to Mataafa's side.

The various bodies of talking-men grant titles, called Papa, or Ao, to which the Samoans attach great importance, but the title need not be granted by the whole body or by a majority, and may even be bestowed by one qualified person. Inferior titles are often borne without consent by two or more chiefs who have each received them legally from different members of the same body; also the Samoan's mind sees no incongruity in a title being both hereditary and elective—that is to say, if the bearer of a title thinks proper, when dying, to bequeath it to his son, or, as is more common, to his sister's son, his wishes will probably be respected.

There are four or perhaps five great titles which stand out above the others and which may confer upon anyone who holds them the

position of Tupa, or King. Curiously enough, the name Malietoa is not one of them. It means "well done, fighting cock," and was given to a hero who distinguished himself in the Tongan wars. Its importance lies in the fact that it carries with it, *ipso facto*, the third and fourth of the titles just referred to. The claim of the present Malietoa Tanu to be king was that his father Malietoa Laupepa bequeathed to him the title of Malietoa, which gave him two titles. Then some of the talking-men of Aana and Atua conferred on him the other two. Further, Tamasese, who claimed that he had an independent right to these, resigned his rights in favor of Tanu. In like manner Mataafa received two of his titles—Lord of Aana and Lord of Atua—from the talking-men of these provinces, while certain Malietoa talking-men gave him the titles of that name. Thus, according to Samoan custom, both candidates for the kingship may have possessed the necessary qualifications for it, and the matter may have been able to be settled only by fighting it out or by the resignation of one of the candidates. It is clear from Samoan traditions that in early times there was no king, in the sense of the head of a monarchical government. The four or five great titles which stand out above the others were but occasionally united in the same hero, and then only until another arose who took them away. The early missionaries, wishing to provide some fixed government and a single ruler upon whom they might exert influence, developed this idea into a kingship. In historic times no king has held undisputed sway in the islands, and Malietoa Laupepa, of whom our information is fullest, was hardly recognized at all outside the town of Apia and the district of Tuamasanga, from which he came. As has already been observed, office in Samoa can by a strange confusion be both hereditary and elective. The king must have the four or five titles conferred on him, but he must also belong to one of the two families of Tupua and Malietoa. Here, again, is a confusion, for Malietoa is a family name as well as a title. Any man of the family may call himself Malietoa, but Mataafa also claims the right to be so styled, not by birth but by election, and both he and Tamasese are members of the Tupua family.*

The white population, like the native, may be separated into classes—the chief justice of Samoa and the president (or mayor) of the municipality of Apia, the one usually an American and the other a German, with the consuls of the three powers that were party to

*I am indebted to the courtesy of one of the Samoan commissioners for these facts.

the Berlin act and the commanders of such war ships as may happen to be in port—form an upper circle of officials, below which are the missionaries, traders, and beach-combers.

The missionaries represent three very different religious faiths. Those of the London Missionary Society (Congregational) have been longest in the field and claim some 27,000 converts. The Catholics, under the direction of French Mariest priests, number 6,000 or 7,000, and support the German interests. The missionaries from the United States are Mormons from Utah, and though but lately arrived have a fair number of followers. Those whom we met were God-fearing men, living with but one wife, and neither preaching nor practicing the objectionable features of their belief. It is to be regretted, however, that as many as three sects should proselyte in the islands. A simple-minded people like the Samoans are not able to comprehend intricacies of doctrine, and, failing to appreciate theological subtleties, see in the efforts made to convert them to a given faith merely the selfsame principle of jealous rivalry which prompts a merchant to make his wares more attractive and less dear than those of his fellow-merchant across the street.

The beach-comber has been aptly described by Robert Louis Stevenson in "The Ebb-Tide" and other tales of the South Sea. The characters he depicts are strictly true to life. Making good in Yankee "smartness" what he lacks in moral force, he has usually fallen into disgrace in England or the United States, emigrated to the Colonies, broken the law there, and extricated himself by means which have enabled him to escape jail, but have driven him into exile, out of range of extradition laws. He lives as a petty lawyer or trader, on the credulity of the native, whose property he endeavors to secure. War and disorder are provender to his cupboard. One Apia beach-comber confessed—a man more naïve but not less cunning than his mates—"we want a condition of anarchy, for anarchy brings men-of-war. War ships carry sailors and marines, who buy our goods and liquor and spend money freely. Every ship-of-war that lies in port for a month leaves in my shop a thousand dollars. What is the advantage of peace?" It is fellows of this class that incite the natives to revolution, and over whom, rather than over the Samoan, a firm hand is necessary. They have been at the bottom of many of the troubles which have arisen since white men first landed, and the late disastrous war can be traced more directly to their machinations than to any other source.

Over a docile and tractable folk, as most of the Samoans are, it should not be difficult to create a permanent form of government that would be acceptable to them. It should be strong enough to be respected, simple enough to be easily understood, and sufficiently economical not to impose too heavy a burden either upon the natives or upon us, who will be held accountable in the event of failure. The form proposed by the Samoan Commission and explained at length by the American commissioner in his report to the Secretary of State, printed as Senate Document No. 51, embodies these principles. In place of the kingship, the commissioners recommended a system of native government, with an executive officer at the head, whom they designated an Administrator, and to whom as the center of authority they gave real powers of administration. The islands were to be divided into certain administrative districts (corresponding as nearly as possible to those recognized by Samoan usage), for each of which a chief was to be responsible, and these chiefs were to meet annually in a native council to discuss such matters as interested them and make recommendations to the Administrator and his cabinet. Native courts were to be allowed to punish minor crimes according to native law and customs, and every provision was to be made to secure to the Samoan population the complete enjoyment of civil and political rights.

It was only after a tour of ten days through the islands, during which, at a series of meetings in the principal villages of each district, the views of the chiefs on government were ascertained, that the commissioners agreed upon the recommendations just cited. Their aim in formulating them was to leave to the native the largest liberty within the district and to teach him self-government through the local assembly until he should be able to take his part in the government of the islands with an intelligence equal to that of the white man. At the same time they all recognized that tripartite rule was impracticable, and that an arrangement like that since agreed upon between the three protecting powers was the only practicable one. In their joint report they strongly advised it, and no one rejoices more than they that it has gone into effect.

# THE MANILA OBSERVATORY

By Rev. Father José Algué, S. J.,

*Director of the Manila Observatory*

The Manila Observatory began its work as a non-official enterprise in the year 1865, under the direction of the Jesuit fathers, who were employed as teachers in their college in the walled city, generally known as the Ateneo Municipal. Soon they commenced observations on their own account, their principal object being the study of typhoons. The following September one of these typhoons did great damage to the city and harbor of Manila, which caused the Jesuits to become more interested than ever in the discovery of the laws of the typhoons, so frequently destructive of life and property in these regions. The first father who acted as director of the new observatory was the Rev. Father Faura, and the first endeavor of the observatory was, of course, to discover, if possible, some way of forecasting any typhoon dangerous to Manila, and to announce within sufficient time to avoid disaster the track the storm would probably follow.

Father Faura was assisted in his task by two other Jesuits, Fathers Nonell and Ricart, and the college provided them with a few meteorological instruments, absolutely necessary for their researches. With these simple means they began a series of observations which were diligently recorded from September, 1865, until the end of 1869. A paper containing these records was sent monthly to the principal observatories of the world, followed at the end of the year by a summary of the meteorological results of each month and a brief account of the principal atmospheric perturbations noticed during the year. In 1868 the institution acquired the universal meteorograph, which had gained for its inventor, Father Secchi (of Rome), a great fame at the Paris Exposition of 1862. With the aid of some wealthy residents of Manila, several other instruments for direct observations were purchased, all of them corrected and compared with the standard instruments of the French Observatory of Montsoures. As with this new set of instruments observations could be recorded on a larger scale, the *Monthly Review* of the observatory was considerably enlarged and illustrated with the correlative meteorological curves of the principal meteorological phenomena of each month.

Seven years later, when the city of Manila and the Philippine Islands in general were beginning to appreciate the utility of the observatory, a subscription amounting to 7,542 Mexican dollars was raised for the purpose of enlarging the observatory and endowing it with more and better instruments. This token of public favor greatly stimulated the Jesuit fathers, and more particularly Father Faura, to carry out their ambition to make the Manila Observatory, if not the very best, one of the best in the Far East. For this purpose, Father Faura visited the principal observatories of Europe. At Rome he had conferences with the famous Italian astronomer, Father Secchi; in England, at Stonyhurst Observatory, he acquainted himself with the method of maintaining a complete magnetic observatory. From thence he proceeded to Paris, where he collected all possible information regarding meteorology, magnetism, and seismology.

On his return to Manila, Father Faura brought new interest to the work of the observatory. Perceiving that there was some connection between barometric oscillations and the proximity of a typhoon, he investigated the relation, and soon found this to be a fact. Thus to Father Faura belongs the honor of being the first in the Far East to predict the existence and to determine the probable path of these storms. The first typhoon warning was published July 7, 1879, stating that a storm was crossing the northern provinces of Luzon. Later advices confirmed the prediction. The typhoon had really crossed the island, and done great damage in the northern provinces of Isabela and Cagayan. On November 18 of that year the observatory announced the approach of another typhoon, and predicted its course as dangerous to the city of Manila. The forecast caused intense excitement throughout the city, but especially in the naval department. The captain of the port, D. Alejandro Churruca, prohibited communication with ships in the bay and suspended all traffic. The governor-general of the islands came in person to the observatory to ascertain the truth of the prediction. The answer was that a typhoon threatened the city, and that it was imperative to prepare for emergencies. Precautions were then effectively taken in accordance with the instructions of Father Faura. The typhoon came, and, owing exclusively to the warning of Father Faura, the city was prepared, and little damage was done by the storm, but in all the other parts of the island where notice could not be transmitted for lack of telegraphic communication the havoc was terrible. Forty-two shipwrecks, with great loss of life, were recorded.

The forewarning of this typhoon brought such honor to the observatory of Manila that its storm warnings have ever since been carefully heeded throughout the Philippine Archipelago. In the year 1880 telegraphic communication by cable was established between Manila and Hongkong, and this gave an even greater importance to the already very useful typhoon warnings of Manila. In the same year the announcements of various typhoons were sent from Manila to Hongkong, where their importance was fully appreciated and favorably commented upon in the papers of that colony, especially in the *Hongkong Daily Press*. Soon afterward the British government, informed of the great value of these storm warnings, established in Hongkong a government observatory, the principal object of which is to give timely notice whenever any typhoon threatens the colony.

Various typhoons occurred during the succeeding years, and the warnings of the observatory concerning nearly every one of them proved to be correct. A new subscription was started in 1881 to provide the institution with still more and better instruments than it already possessed. From the subscription (910 Mexican dollars) two very fine instruments were obtained, namely, a Beckley anemograph and a standard barometer of Negretti. When the news reached the colony of Hongkong, there also a subscription was taken up and the money so obtained sent to the manager of the Manila newspaper *El Comercio*, and by him given to the observatory, where it was employed in the purchase of other valuable instruments for meteorological observation. Thus it is apparent that the appreciation of the Manila Observatory was as great in Hongkong as it was in Manila. Several articles in the newspapers of that colony, especially those of the *Hongkong Daily Press* dated October 5 and 12, spoke in very high terms of the work accomplished at Manila. The same paper stated that in the course of the year 1881 eight or nine typhoons were announced to Hongkong from Manila, and that every one of the warnings proved correct.

We need not tarry in the description of these storms ; a very interesting study of them was made by Father Faura, whose work on this subject has been honorably mentioned by distinguished meteorologists. The same father published soon afterward another pamphlet on the characteristic signs of an approaching typhoon, entitled *Señales Precursoras de Temporal en el Archipielago Filipino*. It is well known throughout the islands, and is one of the most useful and popular papers on typhoons ever published.

The recognition of the observatory as an official department was due to the recommendations of the authorities of Manila and of some of its more influential residents, merchants, and officers of the navy. The value of the observatory during the preceding typhoon season had been so manifest to every one that the local press urged the Spanish government to assist the Jesuit fathers in their humane work. As, at the same time, notice was received that the British government was about to erect an official observatory in Hongkong, the people of Manila became even more anxious to have their own observatory officially recognized by the Spanish government. Their request was warmly seconded by the captain of the port and by the naval commander, D. Felipe Canga Argüelles, and by other distinguished naval officers, who likewise petitioned for the establishment of a series of telegraphic stations along the coast of Luzon, from whence meteorological reports could be rapidly transmitted to Manila.

The request was favorably indorsed by the governor-general of the Philippines and transmitted to the government at Madrid, where it was finally sanctioned, the Queen Regent issuing a decree April 28, 1884, by which the Manila Observatory was officially acknowledged as a government institution, with a regular subvention assigned for its maintenance. As the erection of the minor meteorological stations was sanctioned by the same decree, fourteen telegraphic posts were established in Luzon at points most conveniently situated for meteorological purposes, and were provided with all the necessary meteorological instruments.

Meanwhile some notable events in the history of the observatory were taking place. Father Faura invented his aneroid barometer, an instrument designed to enable any person to detect the approach of a typhoon with but little labor. This aneroid, generally known in the Philippines as the Faura barometer, has become so popular that it is to be found in nearly every steamer and sailing vessel of these waters and in a great many private houses. Another event was the cooperation of the observatory with the observatories of other parts of the world in simultaneous meteorological observations from 1878 to 1888. A further distinguishing tribute was the interest of the Japanese government in the work of the observatory. In February, 1890, the foreign minister of Japan obtained from the governor-general of the Philippines, through the Japanese consul at Manila, permission for the transmission by cable of meteorological observations and all important typhoon warnings.

In March, 1886, the observatory was transferred from the walled city to the handsome block of buildings it now occupies in the suburb of Ermita. This change of location was for the better, as every instrument is now in its proper place, and the surrounding gardens afford plenty of space for outdoor observations. The geographical coördinates of the place are latitude 14° 34′ 41″ north, longitude 120° 58′ 33″ east.

With the removal a new era dawned also on the work of the observatory, for it had gained a much wider field for investigation by the addition of two new departments, namely, the seismical department and the magnetic observatory. These two sections were officially recognized by the Spanish government October 28, 1888. The work accomplished by the two new departments of the observatory covers too wide a field to be considered in this brief account, but any one who desires special knowledge on the subject will find plenty of information in the monthly publications and in the special work on "Magnetism in the Philippines," by Rev. Father Civera, and on "The Earthquakes of the Philippines," by Rev. Father Sadena Maso.

Various scientific expeditions were successfully carried out by the observatory in different parts of the islands with no small amount of labor and even occasional danger. The most interesting of these expeditions were those of Rev. Father Martin Juan and Juan Doyle to Sulu, Palawan Island, and the southern part of Mindanao; the journey of Rev. Father Ricardo Civera to northern Mindanao and Bisayas, and the voyage of Rev. Father Miguel Saderra Mata, then director of the observatory, to China and Japan. The result of these expeditions is the magnetic chart of the Far East published in January of 1892.

The director of the Manila Observatory, Father Miguel Saderra Mata, was officially invited to the Meteorological Congress of the Chicago Exposition. This invitation was accepted, and two Jesuit fathers, Father Frederic Faura and the writer, were commissioned to assist at the exposition as official representatives of the Spanish government. Father Algué had already been two years in the United States, and in his travels through America and Cuba had had many opportunities of becoming acquainted with the distinguished meteorologists of the New World. The results of this scientific mission can be read in the memoir, *La Meteorologia en la Exposicion Colombina de Chicago*, published by the two fathers soon after their return to Spain. Another official invitation was sent to the director of the

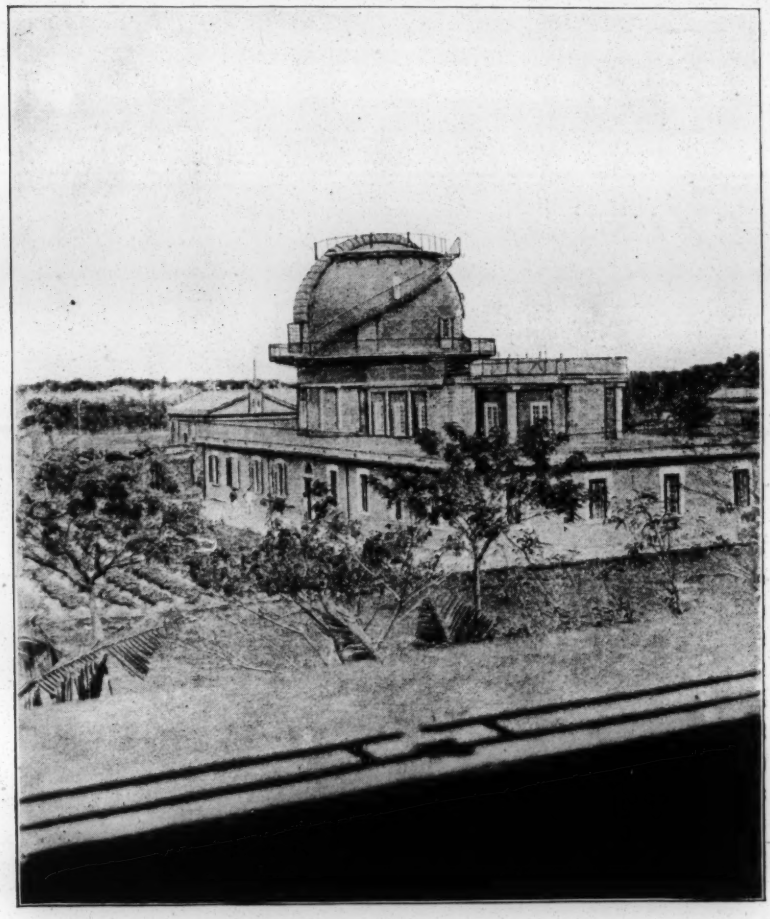
observatory at Manila in 1895 by Mr Robert H. Scott, secretary of the International Meteorological Society, asking the Manila Observatory to coöperate in the international work of cloud measurements, which was to begin May 1, 1896. The director answered favorably, and thus far the Manila Observatory is the only observatory in the Far East which has coöperated with the sixteen observatories of other parts of the world in the international enterprise of cloud-measuring. The details of this work can be found in the publication of the observatory, *Las Nubes en el Archipielago Filipino.*

The equipment of the meteorological department of the observatory is very complete, including instruments for direct observation and self-recording instruments.

Among recent publications of the observatory is a very valuable treatise on the typhoons of the Philippines by the director, entitled *Baguios o Cyclones Filipinos* (1897). It has been honorably mentioned by foreign journals and is now being translated into various languages. Another good work of the director of the observatory is the invention of the instrument called the barociclonometro. It is a combination of an aneroid barometer similar to that of Father Faura, but can be adapted to any latitude, and of a cyclonometer. It is easily handled, and with little labor will indicate to the observer the existence, bearing, and distance of the center of a typhoon.

The installation of the astronomical department was completed in 1894, when the section was transferred to a special building, a solid construction erected in the grounds of the observatory at a cost of nearly $40,000. Here is the great revolving dome, nearly ten meters in diameter. containing the big equatorial telescope, which has a focal distance of seven meters, while the diameter of the objective lens is 49 centimeters. The telescope has a large and costly outfit of additional astronomical instruments, the most conspicuous of which are two large spectroscopes, one of the Töpfer type, made in Berlin, and the other made in London by Hilger. The latter has a grating three inches long, and is one of the largest in the world. The Töpfer spectroscope is of the same size as the one made for the German government at Potsdam. There are three other stone piers in this department, which are to be occupied, respectively, by a comet-seeker, a small photographic equatorial, and an equally small meridian circle. There has also been in regular use since December, 1895, a reflecting zenith photographic telescope for the study of the variation of latitude, a novel instrument, of elegant construction, invented

by the present director. (See "The Reflecting Zenith Telescope," Stormont & Jackson, printers, Washington, D. C., 1893.) For the measurement of photographic plates the observatory possesses two



ASTRONOMICAL OBSERVATORY, MANILA, P. I.

first-class micrometers, one made by Saegmuller, of Washington, and the other by the optician Hilger. The micrometric screw of the latter is seven inches long, and is one of the largest yet constructed.

With these micrometers one ten-thousandth of the millimeter can be read.*

Since the year 1888 the astronomical section has had a twofold duty: first, it has given every day the exact hour of noon in Manila civil time, and, second, it has regulated nearly all the chronometers of steamers and sailing vessels entering Manila Bay. So acceptable has been this work of the observatory that more than a hundred chronometers have been brought in each year since January 1, 1894. The astronomical department has also constantly informed the public of Manila of all phenomena worthy of notice, such as solar and lunar eclipses visible in the locality, the appearance of comets, transits of Mercury, and meteoric showers. The building and entire equipment were provided at the exclusive expense of the Jesuit fathers. The astronomical department was to have been officially recognized by the Spanish government for the financial year 1898, but unfortunately war embarrassed all the scientific projects so much cherished by the fathers of the observatory.

The study of earthquakes and seismic phenomena dates almost from the beginning of the observatory, when the first instruments used for this study were pendulums of very simple construction, for tracing the horizontal and vertical movements of the ground. Other instruments were afterward acquired for direct observation and for recording purposes. Soon after the great earthquake of 1880, which nearly laid the city of Manila in ruins, the Rev. Father Faura, director of the observatory, published a very interesting work about the earthquakes. Hourly microscopic observations were commenced in January of 1881, and in 1887 the *Monthly Review* began to be illustrated with the records of earthquakes that occur so frequently in some part or other of the archipelago. The seismic instruments now actually employed are all firmly fixed to the base of a massive pier that runs through the right tower of the main building.

A fair idea of these instruments may be had in the work *La Seismologia en Filipinas* (pages 4–16). This publication of the observatory is a very important one, and contains a detailed catalogue of the long series of earthquakes that have been felt in the Philippines from 1599 to 1890, with the dates of their occurrence and a statement of their severity. Father Joseph Coronas has recently published an ac-

* See the pamphlet: Der Photo chronograph in seiner Anwendung zu Polhöhenbestimmungen, Von Dr Otto Knopf in Jena (Sonderabdruck aus der Zeitschrift fur Instrumenten-kunde 1894, Heft 3), (Verlag von Julius Springer in Berlin).

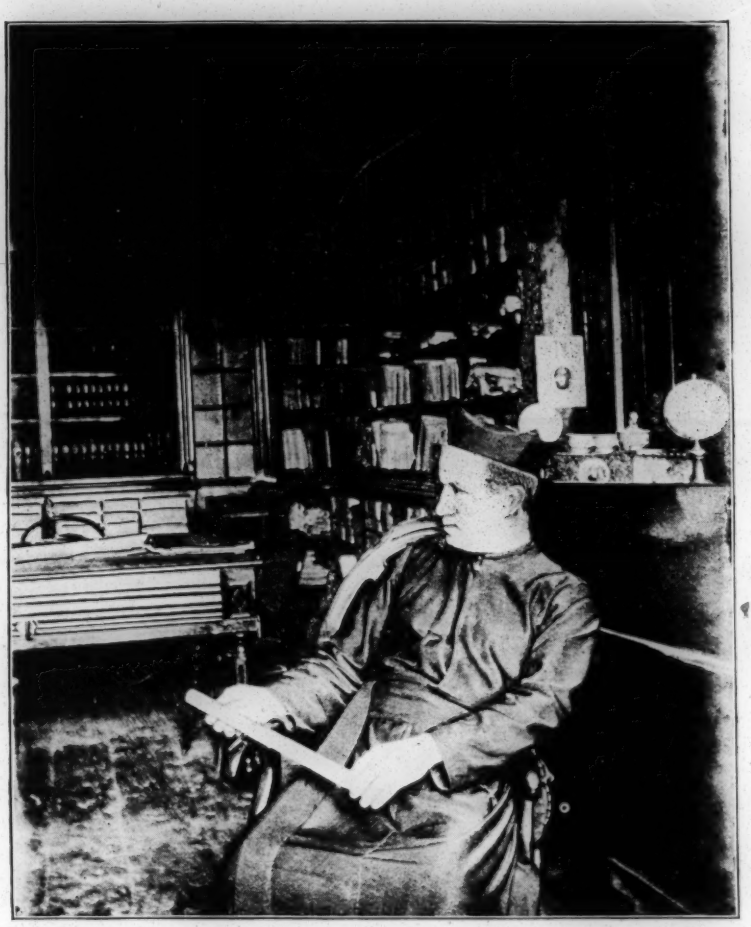
count of the great eruption of the famous volcano Mayon, which on June 25 and 26, 1897, burst forth with tremendous activity, reducing to ashes innumerable dwellings and killing hundreds of people in the surrounding districts. The same father has prepared, but not yet published, an account of the Philippine earthquakes of 1897, and more particularly of the Zamboanga earthquake of September 21 of the same year.

There are not many first-class magnetic observatories in the world, but it may be asserted that the magnetic department of the Manila Observatory is one of them. It is situated in a splendid position, has the finest of instruments, and its scientific results have been highly satisfactory. The department is located in a separate building, inclosed in the grounds adjacent to the normal school and not far from the meteorological and astronomical departments. It is sufficiently distant, however, from other buildings to be free from the influence of any substance capable of disturbing the magnets.

Meteorological reports are received daily from stations along the China coast, from Japan, and also from the minor stations of Luzon, except in time of disturbance. After a careful examination of these reports, the probable state of the weather for the following twenty-four hours is predicted, and then the ordinary weather note finally redacted. This forecast is then telegraphed to the chief officer of the port of Manila and to the United States admiral at Cavite. The daily maximum and minimum temperatures are given out each day to the newspapers of the city. Twice every day, moreover, at 10 a. m. and 4 p. m., the observatory sends to the chief officer of the port the atmospheric pressure, temperature, direction and force of the wind, and probable state of the weather. At the same hours the observatory transmits every day by cable the same observations to the more important stations of Japan and the China coast.

Whenever there are signs of any change in the weather the work and vigilance of the observatory are greatly increased, as is also its responsibility. When the first signs of a typhoon are detected observations are repeated more frequently, especially of the different forms and directions of clouds; more frequent, and even hourly, reports are demanded from those of the secondary meteorological stations of the island of Luzon, where the weather assumes a more threatening appearance; information concerning the whereabouts and progress of the storm is given out freely to the public of Manila, to the chief officer of the port, and any one who desires it, especially those concerned in

the safety of ships and steamers. As soon as it becomes possible for the observatory to locate exactly the bearing of the center of the typhoon and the course it will probably follow, this is notified to the chief officer of the port, with a view to the hoisting of the convenient



FATHER ALGUÉ IN HIS LIBRARY.

storm signal. If the typhoon is not imminently dangerous to Manila, the observatory, nevertheless, follows its course and transmits all interesting information regarding it to the public and to the chief officer of the port. The observatory takes a special interest also in trans-

mitting by wire, if possible, the forewarning of the typhoon to any province or provinces of the archipelago seriously threatened by the storm, in order to prepare them for emergencies. If the progress of the typhoon becomes dangerous to Manila, then, not only during the daytime but all through the night, if necessary, storm warnings, with all important information, are transmitted to the public and to the authorities more frequently, and if thought convenient special accounts of the typhoon are sent to the chief officer of the port. In short, every possible precaution is adopted by the observatory in order to avoid any kind of disaster. The observatory takes an especial care besides to warn all ship owners and shipmasters to beware of the danger threatening ships on the high seas, and advice is given accordingly to retain their vessels in the bay until the weather abates; in case of sailing, the masters of the ships are cautioned regarding the storm and the way of escaping danger.

But the warnings of the Manila Observatory have always, up to the present, had a much wider circulation than in the islands of the Philippine Archipelago. In truth, many times cablegrams have been sent to us, not only from Singapore and Hongkong, but from other outside ports, desiring information about the weather or about the probable track a typhoon would follow, and if we thought it safe for a ship to make the trip to Manila. To these telegrams the observatory has always been very careful to answer with promptness and precision. But we think it useless here to go on reiterating the importance of the storm-warning cablegrams sent from Manila to Hongkong, Macao, Saigon, Shanghai, and Tokio. The geographical position of the Manila Observatory gives it the great advantage over all other observatories in the Far East of being able first to detect the signs of approaching storms and transmit them to the coast of continental Asia and to the Japanese Empire. Experience shows that it takes two or three days, and even more, for the center of a typhoon to cross the China Sea to the Asiatic seaboard, and if the track of the storm curves round to the northeast, from three to ten days, and sometimes more, elapse before the center of the typhoon reaches Japan. It is evident, therefore, that the storm warnings of the Manila Observatory are of the utmost advantage to the whole Asiatic and Japanese coast line from Singapore up to Yokohama. This is the reason why the local governments of Hongkong, Saigon, Macao, Shanghai, and the government of Japan are so much interested in the transmission by cable of the typhoon warnings of the Manila Observatory.

In general, the average number of these storm warnings sent abroad is three for each typhoon. Th first is given when the first signs of the storm are detected, the second when the center of the typhoon is crossing the islands or is at the least distance from them (and this time not only the existence of the typhoon is stated, but also the direction of the storm, if possible), the third and final warning when the center of the typhoon passes out of the archipelago and enters the China Sea or recurves into the Pacific Ocean. The number of these telegrams sent to China and Japan during the years 1894–1897 was as follows: In 1894, 21; 1895, 27; 1896, 34, and 1897, 15, making a total of 97.

These telegraphic warnings have been much appreciated in the colony of Hongkong, as recent events have proved. A distinguished officer of the British navy, after the cutting of the cable between Hongkong and Manila, entreated Admiral Dewey to restore communication, as otherwise great danger would ensue to life and property from the interruption of the telegraphic storm warnings. The United States consul at Honkong also testified to their great value, and requested that the telegrams sent there should also be wired directly to him in the same manner as they were transmitted, before the blockade of Manila, to the Spanish consul in that colony.

It only remains to mention one other public service performed by the Manila Observatory, namely, the gratuitous correction and standardizing of the barometers of ships visiting the port.

---

## THE LIMITED WATER SUPPLY OF THE ARID REGION

By Frederick H. Newell,

*Chief Hydrographer, U. S. Geological Survey*

A few years ago the old ideas as to the utter worthlessness for agricultural purposes of the land west of the 100th meridian gave way to the most extravagant notions concerning its possibilities under irrigation. It was commonly talked that every acre could be reclaimed, and a man who ventured to assert that the water supply would suffice for the reclamation of only a small part of the land was almost in danger of being mobbed.

Now, however, there is no longer talk of irrigating every acre, even of the most fertile soil, and the statement that only 5 or 10 per cent

of the land can be reclaimed excites comparatively little interest. Public sentiment is now concentrated on the question as to how the relatively small quantity of water can be conserved for the largest use.

That the available water supply is relatively small need excite no surprise. The mountain catchment area is small, the great mountain masses, though impressive, covering but a small part of the arid land. An erroneous idea is largely prevalent that mountains abound on every hand, and that the rain and snowfall upon these must necessarily be large. We hear of the large number of mountains rising to heights of 13,000 or even 14,000 feet throughout the West, but the fact must not be lost sight of that these mountains rise from a base which, as a whole, is at a considerable elevation above tide. Mount Washington, in New Hampshire, is not quite 6,300 feet high, while Pikes Peak, Colorado, is over 14,000 feet; but the former rises from a country whose general elevation is but little above sea-level, while in the case of the latter the surrounding area, as a whole, stands at a height of from 5,000 to 6,000 feet. The State having the greatest range in altitude (California) has only about 1,760 square miles at an elevation of over 10,000 feet, out of a total of about 160,000 square miles; in other words, the high, sharp peaks which dominate the landscape and form the catchment areas for the streams are of relatively small extent when compared with the great open valleys where water is needed.

From all the peaks, however, little streams issue, carrying water throughout the year. In May and June these streams gradually swell to torrents, as they are fed by the melting snow. Descending the steep slopes, they pass from the foothills out among the plains, and their waters rapidly shrink and even disappear. Thus it is that following down a stream of considerable size in the mountains one soon reaches the point where it has attained its greatest volume, and beyond this one passes successively through open valleys where the volume of water is noticeably less, and finally may reach a point out on the plains where the bed is occupied merely by pools fed by occasional storms or by slow percolation from underground. Under the brilliant sunlight the hot winds have drunk up the cooling waters from the heights.

These little streams have from prehistoric times been used in agriculture. We find throughout a great part of the arid West the ruins of ancient towns, and even of irrigation canals of considerable size,

built by a forgotten people. The more intelligent of the early explorers who visited these regions and saw the ruins were impressed with the idea that white men might make homes where these earlier peoples had succeeded. It was not, however, until the systematic surveys of Major J. W. Powell were undertaken that the importance of the subject was fully realized. His first elaborate report on the subject, entitled "Lands of the Arid Region," was printed in 1878, and the public then began to realize the possibilities latent within the arid region. This report, printed in several editions, has formed the basis of many popular articles and discussions, and its recommendations, at first treated with neglect and even with scorn, have been of late most highly commended for their breadth and foresight. Unfortunately, the time has passed to carry out the comprehensive plans outlined toward the reclamation of the West, and conditions have arisen which render it impracticable to undertake many of the most desirable and important projects.

Ten years after the publication of this report Congress finally granted authority for the systematic examination of the arid lands. Field work was begun in the fall and winter, being directed toward the mapping of the catchment basins and the detailed surveys of reservoir sites and of canal lines. The appropriation was not passed until October 2, 1888, and it consequently became necessary to push the work energetically in order to show results before the end of the fiscal year. Thus it was that the surveyors were often impeded by snow, and the work which in summer would have been a pleasure became a hardship.

When the work was discussed it was commonly believed that localities suitable for the storage of water could be found almost anywhere in the mountains. This is still a common belief among people who have not given particular attention to the subject. Almost everywhere in the West the inhabitants point out this locality or that where they consider that a reservoir should be built. Careful examination, however, and a survey with instruments of precision often show that the slopes are too great and the capacity too small for a dam to be built to even moderate height. To hold any considerable volume of water, structures of enormous size must usually be erected, and foundations extending far below the surface of the ground must be constructed.

The number of places where conditions are favorable is limited. Sometimes a reservoir site may be found of good capacity and where

a dam of reasonable size and cost can be built; but here, unfortunately, the catchment area tributary to the site is small, and in ordinary seasons the reservoir can not be filled. In such a case as this it may be practicable to bring water by ditches, tunnels, and flumes from some other catchment area, adding to the natural volume.

Occasionally there are found among the mountains small lakes, mainly of glacial origin, whose outlet can be closed at moderate cost, and a considerable quantity of water otherwise escaping during the spring can be held for use later in the year. Such opportunities are, unfortunately, more often found on the headwaters of streams already furnishing an abundant supply than on those whose volume is deficient.

The surveys of reservoir sites inaugurated during 1888 were pushed with considerable vigor during 1889 and 1890, resulting in the examination of several hundred, mainly in the States of California, Nevada, Utah, Colorado, and Wyoming. Without going into the details of these surveys, it may be said that the results were, as a whole, disappointing, particularly to professional promoters, who had in contemplation schemes involving gigantic enterprises, whose stocks and bonds might be manipulated. These men seemed to feel a personal animosity toward the organization conducting the surveys, because glowing accounts of wonderful wealth were not supplied to stimulate the waning interest in Western development.

It was found, too, that the construction of these reservoirs not only involved large expenditures, but that the conditions of ownership were such that they could not be considered paying propositions. There was no question as to the benefits that would result to the country at large from their construction, but there seemed to be little opportunity for private profit. Of the reservoirs surveyed, few have actually been constructed. Coöperative enterprise has in a few cases brought them to completion, and in other instances corporations owning large canals have been compelled by circumstances to build storage works. The great reservoirs, for the most part located in California, have been built by corporations, mainly through some extraordinary combination of circumstances or through a misapprehension of the actual conditions.

The investigations that have been made were carried on for the purpose of ascertaining the extent to which the arid lands could be redeemed by irrigation. The object was to bring out the broad facts concerning the probabilities of the ultimate development of the arid

region. There were, of course, many localities where it was self-evident that water could be held to advantage, as, for example, in Southern California, where the climatic conditions were such that the semi-tropic fruits flourished to perfection. The valleys of this part of the State, relatively small in size, are protected on the north by mountains which rise abruptly from sea-level, and from these small streams flow in torrential channels. The rapid development of population in these small valleys, due to the salubrity of the climate and the great profits derived from the cultivation of fruits and nuts, early resulted in all the available water supply being utilized, and in compelling the consideration of methods of storing some of the flood-waters. The utilization of these storage sites was further promoted by the fact that most of the desirable land in this part of the country was covered by the early Spanish land grants, the title to which had been confirmed by the United States. Thus these great tracts were not a portion of the public land and did not depend upon favorable legislation for the inauguration of private enterprise. From these and other reasons it has happened that the actual construction of storage reservoirs in Southern California has been far ahead of similar work within what is more strictly the arid region.

---

## HURRICANES ON THE COAST OF TEXAS

By General A. W. Greely, U. S. Army

The graphic and timely article of Professor W J McGee on the terrible calamity that befell the city of Galveston, Texas, has been perused with great interest. Certainly every thoughtful reader must be impressed with his remarks on dangers incident to the building of cities on coastal formations, such as form the shore-lines of the great State of Texas.

It is not my desire nor intention to enlarge upon the geological formations of the coasts of the Gulf of Mexico, nor to discourage the afflicted citizens of Galveston from their energetic efforts to restore their heretofore prosperous city to its former position, as the greatest commercial entrepôt of Texas. Indeed, it is my firm conviction that the ingenuity of man is such that he will be able to adopt such engineering devices as will protect Galveston from a repetition of the

enormous loss of life and property which was caused by the advance of the last West India hurricane.

It is simply my wish to reënforce Professor McGee's cautions by alluding to another chapter in the hurricane history of the Texas coast, concerning which his article is strangely silent, but with which I chance to be somewhat familiar. Reference is made to the hurricane of September 15–16, 1875, which caused a relatively greater loss of life and property to the town of Indianola, Texas, than was inflicted on Galveston by the recent hurricane. A quarter of a century has dimmed the recollection of the Indianola tragedy, and many of the few adult survivors of that ill-fated town have passed over to the silent majority.

Indianola, when I first knew it in 1873, was a town of about 1,500 inhabitants, but it was then waning in population, so that at the time of the storm it had a population variously estimated from 800 to 1,000. In the cyclone of September, 1875, at Indianola, the loss of life, as officially reported by the Signal Corps observer-sergeant, was 176—nearly one-fifth of the entire population—and the destruction of property as exceeding one million of dollars in value.

It should be remembered that Indianola is on the west shore of Matagorda Bay, 14 miles from the Gulf of Mexico, a sheltered position as compared with that of Galveston. I visited Indianola about six months after the hurricane, when the town was partly restored; but at that time there remained evidences of one of the greatest storms of the century. The striking physical changes were the formation of a large lake in the rear of the town and the plowing of numerous bayous inland, five connecting across the solid land of an elevation ranging between 10 and 20 feet above the level of Matagorda Bay, on which the town was built. One of these bayous was nearly 20 feet deep at the time of my visit.

As at Galveston, enormous quantities of sea water were driven inland and the greatest damage and loss of life occurred during the ebbing of the flood seaward. On the coast, at the entrance to Matagorda Bay, both the east and west shoal lights were carried away. The extent and violence of the storm inland may be judged by the fact that at this time the schooner *Agnes* and the *Phœnix* were wrecked two miles inland from Indianola, while the schooner *Comet* was carried five miles inland. So sudden and rapid were the flood waters inland that about 15,000 head of cattle and sheep were drowned.

The hurricane began by a northeasterly gale, which set in on the

15th. The wind increased steadily in force, with a falling barometer, until 5 p. m. of the 16th, when it stood at 28.90. The northeast wind of 82 miles per hour rose to a velocity of 88 miles at 5.15 p. m., but later, as it steadily increased, its velocity at midnight must have reached 100 miles.

But the loss of property least engrossed the attention of Indianola, when the lives of all were for hours in the balance. Realizing the situation, the strongest and best bent their energies to the task before them. During the forenoon of the 16th several hundred lives were preserved by the removal of the inmates of damaged and weak houses to the strongest and most protected buildings. Many people, women and children especially, were thus safely transferred by life-boats. Had it not been for these timely and well-directed efforts during the day, it is believed that more than one-half of the population would have perished.

The following extracts from the official report of Sergeant C. A. Smith, Signal Corps, show the character of the storm later:

"The rain and wind both increased up to midnight, when the velocity must have been fully 100 miles per hour. This would have blown in the doors and windows, coming in gusts as it did, but for the precaution which had been taken of securely boarding them up. Soon after midnight a change in the tide was noticed; it rose several inches for a few minutes, and then began setting seaward rapidly. This evidence of abatement was hailed with shouts of joy, and was confirmed in a few minutes by the action of the wind, which gradually backed to the north and northwest.

"The tide now swept out toward the bay with terrific force, the wind having but slightly abated, and it was at this time that the greatest destruction to life and property occurred. The buildings remaining had been so loosened and racked by northeast wind and tide that the moment the tremendous force was changed in a cross-direction dozens of them toppled in ruins and were swept into the bay.

"It is a noteworthy fact that the immense volume of water, which for 18 hours poured over the beach at Matagorda Bay until for 20 miles the back country of prairie was an open sea, occupied but the short space of six hours to completely recede on the wind changing to the northwest.

"The morning of the 17th opened cool and cloudy, with a gale still blowing from the northwest. We emerged from our retreat at

an early hour, and it was not until then we could appreciate the full extent of the calamity which had befallen the town.

"Fully three-fourths of all the buildings had entirely disappeared from the scene, and of those remaining, a large part were in utter ruins. Many of those remaining had been swept from their original foundation—some but a few yards, others several blocks.

"Numerous bayous indented the shore, occupying the places where prominent buildings stood 24 hours previous. Five of these bayous extended clear across the town, and now join the lake in rear of the town. Seven others of considerable proportion had extended their encroachments but partially across."

Leaving Indianola much impressed by the immense damage wrought, and a few days later passing through Galveston, I broached to Mr E. O. C. MacInerney, for years city clerk, the probability of Galveston suffering similarly in later years. Mr MacInerney had served for years as an observer-sergeant of the Signal Corps at Galveston, and was alive to the observations I then made. He informed me that steps were being taken to strengthen the ocean beach so as to render it less liable to the action of the sea. Whether such corrective measures were continued or not I do not know, but it is evident both Galveston's late experience and the fate of Indianola, which was practically destroyed, emphasize the gravity of the situation. The best engineering talent of the country should apply itself to the prompt solution of the problem of protecting the tens of thousands of valuable lives and tens of millions of property from the assaults of the sea, whose wildest hurricanes threaten the stability of the western Gulf coast.

---

## AFRICA THE LARGEST GAME PRESERVE IN THE WORLD

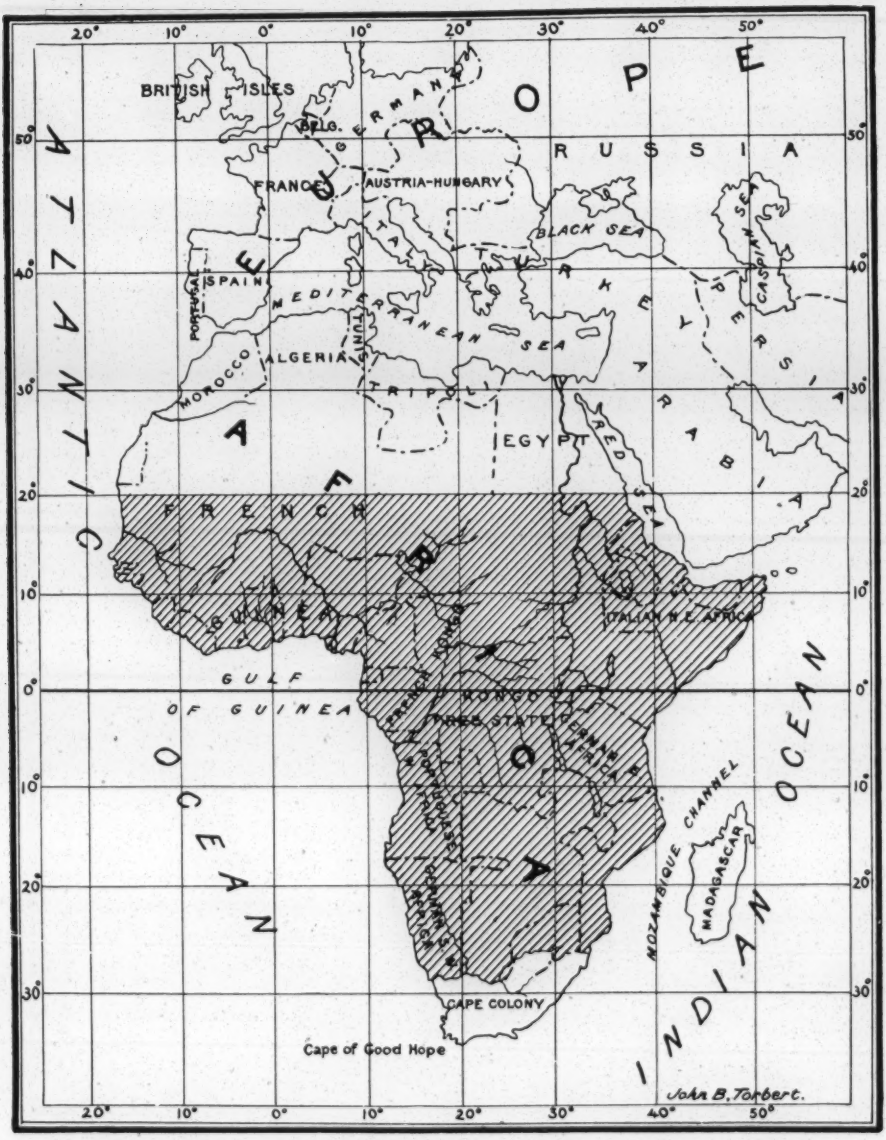
The fact that the wild animals of the world are in danger of extermination is being forcibly driven home to the minds of all who are interested in natural history. This condition is the result of the ruthless persistence with which game of every kind is hunted, and it may be laid at the door mainly of the rapacious gatherers of hides and ivory. These, however, are assisted to a marked degree by sportsmen and hunters, who for mere sport kill great numbers of valuable animals and wantonly slaughter the fish and birds.

Notwithstanding this, Africa is still rich in animals, birds, and fishes, and by placing certain restrictions upon their destruction many species that would otherwise be exterminated may be fostered and perpetuated. Both the professional hunter and the sportsman would then be able to gun or fish with reasonable success without endangering the future supply of game.

In London, on May 19 of the present year, a convention was signed by the diplomatic representatives of Great Britain, Germany, Spain, Belgium, France, Italy, and Portugal for the protection of the wild animals, birds, and fishes of Africa, which convention, after being ratified by the powers, is to remain in force for fifteen years. By thus acting in concert, the European nations who are most interested in Africa, through their extensive colonial possessions, have formed themselves into a powerful game-protective association, with jurisdiction over the most extensive game preserve in the world.

The area over which the provisions of the convention are to apply includes all that portion of the Dark Continent extending from the twentieth parallel of north latitude to the southern line of the German possessions in southwestern Africa, and from the Atlantic Ocean to the Indian Ocean and the Red Sea. Under the terms of the convention, the hunting and destruction of vultures, secretary birds, owls, giraffes, gorillas, chimpanzees, mountain zebras, wild asses, white-tailed gnus, elands, and the little Liberian hippopotamus is prohibited. The young of certain animals, including the elephant, rhinoceros, hippopotamus, zebra, antelope, gazelle, ibex, and chevrotain, are protected, and also the same species when accompanied by their young. Particular emphasis is laid on the protection of young elephants, and all elephants' tusks weighing less than twenty pounds are to be confiscated by the government if the animal was killed after the convention went into effect. The eggs of the ostrich, among those of a large number of other birds, are to be protected, but those of the crocodile and of poisonous snakes and pythons are to be destroyed. A limited number of lions, leopards, hyenas, otters, baboons and other harmful monkeys, large birds of prey, crocodiles, poisonous snakes, and pythons may be killed.

The method of taking or killing game is regulated to the extent that the use of nets and pitfalls is forbidden, and dynamite and other explosives must not be used for taking fish. Only persons holding licenses issued by the local governments are allowed to hunt wild




MAP OF AFRICA, SHOWING TERRITORY WITHIN WHICH THE CONVENTION OF MAY 19, 1900, PLACES RESTRICTIONS ON THE KILLING OF WILD ANIMALS.

animals within the protective zone, and these are revocable where the provisions of the convention are in any way violated.

Another provision of the convention is that the contracting parties shall, as far as possible in their respective territories, encourage the domestication of zebras, elephants, and ostriches.

JOHN B. TORBERT.

---

## ANNOUNCEMENTS

The Board of Managers of the National Geographic Society begs to announce to the resident members that about 200 responses to circular letter of October 18, 1900, have been received. A very large majority of the replies favor a reduction of the number of lectures by dropping either or both the Lenten and Technical courses.

With this positive expression of preference on the part of the resident members, and in view of the probable increase in cost of the Technical course, due to the fact that a more expensive hall than that of Columbian University would have to be secured. the Board has decided to discontinue the Technical course during November and December and to omit the Lenten course of the present season. The Popular course at the Congregational Church will be given as heretofore on alternate Fridays, beginning Friday, November 9, 1900.

Membership tickets admitting two persons to the lectures and a preliminary notice of the lectures during November and December will be mailed in a few days.

### POPULAR LECTURES DURING NOVEMBER

The course of Popular lectures will be opened Friday, November 9, 1900, by Mr M. H. Saville, of the American Museum of Natural History, New York, the subject being "The Ancient City of Mitla, Mexico." The lecture will be illustrated by lantern slides.

The second lecture will be given by General A. W. Greely, Chief Signal Officer, U. S. A., on Friday evening, November 23, 1900. General Greely's subject will be "A Trip through Alaska."

The lectures will be given in the Congregational Church, corner of Tenth and G streets northwest, at 8 o'clock p. m. sharp.

**Burlington Route**

PERSONALLY CONDUCTED
TOURIST PARTIES TO

# California

Leave BOSTON every Tuesday
Leave CHICAGO every Wednesday
Leave ST. LOUIS every Wednesday

## Comfortable and Inexpensive

SELECT PARTIES leave Boston every Tuesday via Niagara Falls and Chicago, joining at Denver a similar party, which leaves St. Louis every Wednesday. From Denver the route is over the Scenic Denver and Rio Grande Railway, and through Salt Lake City.

Pullman Tourist Sleeping Cars of a new pattern are used. They are thoroughly comfortable and exquisitely clean, fitted with double windows, high-back seats, carpets, spacious toilet-rooms, and the same character of bedding found in Palace Cars. They are well heated and brilliantly lighted with Pintsch gas. Outside they are of the regulation Pullman color, with wide vestibules of steel and beveled plate glass. Beautifully illustrated books on California and Colorado, with maps, train schedules and complete information can be had from any of the following Burlington Route agents:

E. J. SWORDS
379 Broadway
NEW YORK CITY

W. J. O'MEARA
306 Washington Street
BOSTON, MASS.

H. E. HELLER
632 Chestnut Street
PHILADELPHIA, PA.

F. E. BELL
211 Clark Street
CHICAGO, ILL.

C. D. HAGERMAN
703 Park Building
PITTSBURG, PA.

J. G. DELAPLAINE
Broadway and Olive Streets
ST. LOUIS, MO.

# SOUTHERN RAILWAY

## GREATEST SOUTHERN SYSTEM.

TO ALL POINTS SOUTH, SOUTHEAST, AND SOUTHWEST.

**Through Pullman Drawing Room Sleeping Cars from New York and Washington to New Orleans, Memphis, Port Tampa, Jacksonville, Augusta, and Intermediate Points—First-Class Day Coaches—Dining Car Service.**

Fast Trains for the SOUTH leave Washington Daily at 11.15 A. M., 9.50 P. M., and 10.45 P. M.

Through Tourist car on the 10.45 P. M. Train every Monday, Wednesday, and Friday for Texas, Arizona, and California points, without change.

Direct line to the Summer Resorts in Virginia and the Carolinas and the Winter Resorts of Florida, Gulf Coast, Texas, Mexico, and California.

Direct Through Car Line to and from Asheville, Hot Springs, and other Western North Carolina points—"THE LAND OF THE SKY."

For Map Folders, Summer Homes Folder, and Book on "ASHEVILLE AND THEREABOUTS" write to—

A. S. THWEATT, Eastern Passenger Agent, 271 Broadway, New York, N. Y.
J. C. HORTON, Passenger Agent, 201 E. Baltimore Street, Baltimcre, Md.
L. S. BROWN, General Agent, 705 Fifteenth St. N. W., Washington, D. C.
W. B. BROWN, Passenger Agent, Norfolk, Va.

S. H. HARDWICK, Assistant General Passenger Agent, Atlanta, Ga.
C. A. BENSCOTER, Assistant General Passenger Agent, Chattanooga, Tenn.
W. H. TAYLOR, Assistant General Passenger Agent, Louisville, Ky.

J. M. CULP, Traffic Manager.

W. A. TURK, General Passenger Agent, WASHINGTON, D. C.

# The Mutual Life Insurance Co.

## OF NEW YORK,

RICHARD A. McCURDY, President,

**Is the Largest Insurance Company in the World.**

**The Records of the Insurance Department of the State of New York SHOW THAT The Mutual Life**

| | |
|---|---|
| Has a Larger Premium Income - - - - | ($39,000,000) |
| More Insurance in Force - - - - - | ($918,000,000) |
| A Greater Amount of Assets - - - - | ($235,000,000) |
| A Larger Annual Interest Income - - - | ($9,000,000) |
| Writes More New Business - - - - | ($136,000,000) |
| And Pays More to Policy-holders - - | ($25,000,000 in 1896) |

**THAN ANY OTHER COMPANY.**

**It has paid to Policy-holders since its organization, in 1843, - - $437,005,195.29**

ROBERT A. GRANNISS, Vice-President.

WALTER R. GILLETTE, General Manager. FREDERIC CROMWELL, Treasurer.
ISAAC F. LLOYD, Second Vice-President. EMORY McCLINTOCK, Actuary.
WILLIAM J. EASTON, Secretary.


JUDD & DETWEILER, PRINTERS, WASHIINGTON, D. C.